

ABSTRACT OF THE DISCLOSURE

Method of nuclear transfer involving the transplantation of differentiated donor cell nuclei into enucleated oocytes of a species different from the donor cell, in conjunction with compatible cytoplasm and/or mitochondria (of same species as donor), are provided. The resultant nuclear transfer units are useful for the production of isogenic embryonic stem cells, in particular human isogenic embryonic or stem cells. These embryonic or stem-like cells are useful for producing desired differentiated cells and for introduction, removal or modification, of desired genes, e.g., at specific sites of the genome of such cells by homologous recombination. These cells, which may contain a heterologous gene, are especially useful in cell transplantation therapies and for *in vitro* study of cell differentiation. Nuclear transfer efficiency is enhanced by introduction of compatible cytoplasm or mitochondrial DNA (same species or similar to donor cell or nucleus). Also, nuclear transfer efficiency can further optionally be enhanced by genetically altering donor cells to inhibit apoptosis, by selecting for a specific cell cycle and/or by culturing under conditions that enhance embryonic growth and development.